

# Space Hub Sutherland

Step 1B Design Principles  
Second Gateway Submission



Highlands and Islands Enterprise  
Iomairt na Gàidhealtachd 's nan Eilean

## Document Details

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## Glossary of Terms

Acronym	Meaning
ACP	Airspace Change Proposal
AFUA	Advanced Flexible Use of Airspace
AIP	Aeronautical Information Publication
ALARP	As Low As Reasonably Practicable
AMS	Airspace Modernisation Strategy
ANSP	Air Navigation Service Provider
ASM	Airspace Management
ATC	Air Traffic Control
ATM	Air Transport Movement
<b>BMAA</b>	<b>British Microlight Aircraft Association</b>
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAT	Commercial Air Transport
DA	Danger Area
DAATM	Defence Airspace and Air Traffic Management
<b>EIA</b>	<b>Environmental Impact Assessment</b>
<b>EEZ</b>	<b>Exclusive Economic Zone</b>
FAS	Future Airspace Strategy
ft	feet
FBZ	Flight Planning Buffer Zones
FIR	Flight Information Region
FRA	Free Route Airspace
GA	General Aviation
HIAL	Highland and Islands Airports Limited
HIE	Highlands and Islands Enterprise
HSE	Health and Safety Executive
ICAO	International Civil Aviation Organisation
<b>Leq</b>	<b>Equivalent continuous sound level</b>
<b>LLSC</b>	<b>Lanarkshire Lothian Soaring Club</b>
LoA	Letter of Agreement
MOD	Ministry of Defence
MOU	Memoranda of Understanding
NATMAC	National Air Traffic Management Advisory Committee
NATS	formerly National Air Traffic Services
NERL	NATS (En Route) plc
NOTAM	Notice to Airmen
<b>NRTE</b>	<b>Naval Reactor Test Establishment</b>
OGA	Oil & Gas Authority
RDA/Z	Range Danger Area/Zone
RMZ	Radio Mandatory Zone
RSPB Scotland	Royal Society for the Protection of Birds Scotland
SAR	Search and Rescue
<b>SHPF</b>	<b>Scottish Highland Paragliding Federation</b>
SHS	Space Hub Sutherland
SI	Statutory Instrument
SIA	Space Industry Act (2108)

Acronym	Meaning
SUA	Special Use Airspace
TMZ	Transponder Mandatory Zone

## Design Principles Development

### Background

During the Design Principles step, the sponsor develops those principles which will underpin their proposed options for an airspace change. These principles include the safety, environmental and operational criteria, together with any strategic policy objectives that underpin the proposal. They are developed through engagement with stakeholders and form a qualitative structure against which design options can be subsequently evaluated.

Issue 1 of this Design Principles document was submitted to the CAA for assessment at a DEFINE Gateway held on 29 November 2019. At the Gateway, the CAA assessed that the Environmental Design Principle was not broad enough and asked for additional input to meet CAP 1616 requirements. The sponsor therefore revised the Design Principle and circulated it for comment to all of the stakeholders previously identified (listed at Annex A1), during the period 09 December 2019 to 13 January 2020. Unfortunately, the incorrect document was initially circulated (the Design Principles Document 71270 013 that was submitted to the CAA DEFINE Gateway was sent out instead of the Revised Environmental Design Principle Document 71270 025). This was rectified and reissued to all stakeholders on 07 January 2020 highlighting that an error had been made. To mitigate the impact, the six stakeholders who had already responded were contacted individually and four of them replied to confirm they had no additional input to the revised document. The respondents who did not subsequently reply were the British Microlight Aircraft Association (BMAA) and the Honourable Company of Air Pilots, whose original comments did not influence the revised environmental Design Principle. In addition, further comment was received on the corrected document from an additional seven stakeholders, bringing the total number of respondents to thirteen. Therefore, we believe that having specifically contacted those who had already responded and having received further responses after the correct document had been issued, the quality and effectiveness of stakeholder engagement has still met the requirements of CAP 1616.

This document addresses the concerns raised by the CAA at the 29 November 2019 DEFINE Gateway and the stakeholder responses to subsequent engagement regarding the level of environmental assessment required for the proposed airspace change.

As the environmental Design Principle was the only one with which the CAA raised issue at the 29 November 2019 DEFINE Gateway, only elements related to that single Design Principle and responses to the engagement have been amended in this document. In all other instances the document remains the same.

This document describes how Highlands and Islands Enterprise (HIE) has conducted such engagement to support the Sutherland Space Hub (SHS) Airspace Change Proposal (ACP-2019-04). The engagement was conducted in accordance with the Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 1616 *Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements*, Stage 1, Step 1B.

A Statement of Need was submitted to the CAA on 03 February 2019 identifying that HIE sought an appropriate volume of airspace for Vertical Launches from Space Hub Sutherland. The airspace would be required for a period prior to and after launch on an occasional basis, so that all aviation activities can continue safely.

The ambition for SHS is to create a facility in the UK for the vertical launch of small satellites. No horizontal launch capability or manned space travel is planned from the facility. HIE, the sponsor,

is teaming with a range of partners to develop the supply chain and support services to promote economic growth and create local jobs. The ACP is but one part of regulatory engagement required to establish the Space Hub; on the wider programme, this includes applications for:

- Planning, issued by Highland Council;
- The Scottish Land Court<sup>1</sup>;
- A Spaceport Licence, issued by UKSA/CAA;
- A Range Control Licence, issued by UKSA/CAA;
- Launch Operator Licences, issued by UKSA.

All licences need to be in place before a launch can take place. Extensive community engagement in all elements of the project has been a key part in its development.

## Design Principles Development

In Stage 1 (DEFINE) of the airspace change process, the CAA requires the sponsor to produce a Statement of Need<sup>2</sup> and a set of Design Principles, following two-way engagement with stakeholders who might be impacted by the proposal. This ensures that stakeholder groups have a good understanding of the proposed change and can identify those design considerations that are important to them.

A range of stakeholder organisations and groups were identified by the sponsor who were invited to help develop the Design Principles for the ACP. These stakeholders have been drawn from the aviation industry and representatives of the local community.

Two main activities have helped to identify the list of potential Design Principles:

- Separate Design Principles development questionnaires, sent to aviation and non-aviation stakeholders respectively, with the option to reply either by email or online through MS Forms; and
- Separate aviation and non-aviation stakeholder Focus Group meetings.

Aviation stakeholders included Air Navigation Service Providers (ANSPs) and the Ministry of Defence (MOD), the local General Aviation (GA) community, local airport operators and members of the National Air Traffic Management Advisory Committee (NATMAC). Non-aviation stakeholders included local authorities, representatives of the local community such as crofters organisations, together with conservation and environmental groups, Members of Parliament and Members of the Scottish Parliament. A full list is included in Annex A1.

Information gleaned from stakeholder Focus Group meetings and responses to the Design Principles development questionnaires were used to develop design themes and subsequently Design Principles. These draft Design Principles were then subject to a second round of stakeholder engagement as described under 'Design Principles Review' below and then analysed to produce a prioritised shortlist of Design Principles.

## Design Principles Questionnaires

The Design Principles questionnaires provided early stakeholder engagement, as promoted in CAP 1616, to help define and agree a set of Design Principles that consider the social, environmental and economic views of all stakeholders.

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<sup>1</sup> A Court of law. The Court's jurisdiction is set firmly within the context of Scottish farming (<http://www.scottish-land-court.org.uk/>)

<sup>2</sup> The SoN can be found on the CAA airspace change portal at the following address: <https://airspacechange.caa.co.uk/PublicProposalArea?PID=125>

The questionnaires included introductory context on the proposed airspace change, including background to the sponsor's aspirations for the SHS launch facility and an introduction to the ACP process that can be found in CAP 1616. The introduction to the questionnaires also made clear this initial engagement was focused solely on the airspace change and not on other aspects of the SHS project. The questions posed are listed at Annex A2. The questionnaires were distributed on 19 September 2019, with a response requested by 21 October 2019. Due to an administrative error, some stakeholders received the incorrect questionnaire and a corrected email was sent on 23 September 2019.

The launch of ACP engagement was concurrent with the run-up to the 12-week formal consultation in support of the site's Planning Application that began on 02 October 2019. Preparatory local engagement for the Planning Application has been ongoing since August 2018, with a number of stakeholder activities.

There were a limited number of responses to the questionnaires, with only 9 in total received: 6 from aviation stakeholders and 3 from non-aviation stakeholders.

Responses to the aviation questionnaire included a comprehensive response from both NATS and DAATM (for the MOD) together with one from a local private pilot, a local GA 'ferry' company and a Search and Rescue (SAR) organisation. The final aviation reply was a generic reply from a national GA organisation. All of these responses provided very useful information for the subsequent development of Design Principles.

The 3 non-aviation responses comprised 2 from conservation organisations who were concerned with the environmental impact of launches and one from the nearby nuclear facility, in respect of launch vehicle failure modes. There were no responses to either the stakeholder questionnaires or comments in Focus Group meetings regarding the environmental impact of the proposal on local residents.

The lack of response from aviation stakeholders might be explained by the geographical remoteness of the airspace in question and the low level of aviation activity in the area. After the closing date for responses had passed, the sponsor was made aware of a further 4 potential aviation stakeholders, helicopter companies that operate in support of the UK oil, gas and renewables industries, occasionally to the north of Sutherland. Although these companies have not yet been engaged, they will be contacted and asked to comment on all further stakeholder engagement activities.

Three reasons are suggested for the limited number of responses from non-aviation stakeholders. First, the Sutherland region is very sparsely populated. Also, perhaps as a result of the request to focus specifically on the ACP, rather than the broader project, individuals may have felt discouraged to reply. Also, the ACP questionnaire request came in addition to a several other stakeholder engagement and consultation activities that have been underway for more than a year. These include monthly meetings associated with the development of the site Planning Application and, more recently, weekly stakeholder meetings. There is a suggestion that local stakeholders may be experiencing 'consultation fatigue' and, although engagement to date from non-aviation stakeholders has been limited, as the proposal progresses, every effort will be made to encourage their more active participation.

The questionnaire documents, along with the responses received, are available on the CAA portal alongside this document.



## Focus Groups

Targeted stakeholders were also invited to attend one of two Focus Groups: the first, for non-aviation stakeholders, was held in the Kyle Centre, Tongue, Sutherland on 09 October 2019 and the second, for aviation stakeholders, was held at the HIE offices, Inverness, on 11 October 2019. The purpose of the Focus Groups was to provide additional information on the ACP requirement; to brief attendees on the CAP 1616 process and to explore ideas in the joint development of Design Principles. In addition, Focus Groups were asked to assess the appropriateness of the CAA's decision to allocate the ACP a Level 1 status; in both Focus Groups there was unanimous agreement that Level 1 was the appropriate level for this ACP.

Minutes of the Focus Group meetings can be found on the CAA portal alongside this document.

## Design Principles Review

Responses from the Focus Groups and questionnaires were assessed and, together with the sponsor's own further analysis, formed the basis of the draft Design Principles Review document, and these are listed below under 'Potential Design Principles'. During a second round of engagement, the review document was sent to all stakeholders on 31 October 2019<sup>3</sup> for, an albeit short review, with responses requested by noon on 07 November 2019. In their response, the MOD stated that in the future they would be grateful for more time to consider proposals with internal stakeholders. Stakeholders were invited to comment on the Design Principle statements themselves and how they might be prioritised. The next section entitled 'Potential Design Principles' provides an analysis and prioritisation of the Design Principles, identifying the origin of specific contributions received and how they affected the development of the final suite of Design Principles.

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<sup>3</sup> Three RNLI stations were re-sent the review document on 6 November 2019.



## Potential Design Principles

### Introduction

We recognise the importance of engagement and transparency throughout the ACP process. During engagement we shared our progress with stakeholders and sought additional feedback, including one-to-one meetings and email exchanges, for example with NATS and DAATM. The shortlist of potential Design Principles that had been developed was shared with all stakeholders, and we invited them to comment again through a second round of engagement.

### List of Potential Design Principles

After analysing all of the stakeholder questionnaires and feedback gathered from Focus Groups and one-to-one engagement activities, the following draft Design Principles, listed in Table 1 below, were sent to stakeholders for comment:

	Category	Design Principle
DP1	Safety	The safety of other airspace users is the paramount consideration in the design of the ACP.
DP2	Operational	In accordance with Flexible Use of Airspace (FUA) principles, the volume of segregated Special Use Airspace (SUA) defined will be of the minimum dimensions necessary, activated for the minimum duration required, to ensure the safety of other airspace users whilst minimising its impact.
DP3	Operational	Space Hub Sutherland will only be for vertical launches.
DP4	Operational	The SHS ACP shall take into account the implications for SUA of Free Route Airspace (FRA) and CAP 1711, which will impact upon the design of associated Flight Planning Buffer Zones (FBZ) and subsequent notification requirements.
DP5	Operational	The SHS ACP shall employ current and evolving best practise in the notification, activation and deactivation of the SHS airspace.
DP6	Operational	As part of the design process, the priority afforded to the proposed airspace will need to be agreed, and subsequently managed, in line with government priorities and taking account, for example, of adjacent MOD FUA.
DP7	Operational	The airspace design shall include the development of Letters of Agreement (LoA) and Memoranda of Understanding (MoU) between relevant parties.
DP8	Operational	The airspace design will aim to minimise the re-routing of aircraft, including those low-flying.
DP9	Operational	The proposal will comply with internationally recognised norms for related spaceflight activities that transit the airspace of other states.
DP10	Operational	The ACP may seek to legally prohibit overflight of some areas associated with the SHS operation through the application of byelaws or Statutory Instruments (SIs).
DP11	Environmental	HIE will be required to undertake an Environmental Assessment associated with the re-routing of aircraft to avoid SUA. <b>This DP is re-assessed below.</b>
DP12	Regulatory	The ACP will take into account other regulatory requirements associated with SHS and, where available and appropriate, reuse existing assessments

Table 1 List of Potential Design Principles

## Review Process and Prioritisation Methodology

Responses received were analysed for their impact on the draft Design Principles, which were then either amended, or a justification was provided explaining why the original Design Principle was taken forward.

To produce a prioritised list of Design Principles, stakeholders were invited to allocate a priority ranking to each Design Principle from 1-12. Their rankings (where provided) were then analysed, although there were too few responses to conduct a quantitative analysis. Instead, priorities were banded into 4 and allocated letters A-D, which the sponsor has ranked as 'A' being the most important and 'D' the least important.

## Responses Received

From the emails sent to organisations and individuals during the initial Stakeholder Review, a total of 8 responses were received, although none from National Aviation Organisations on the NATMAC list. Those received were from:

- ANSPs and the Aviation Industry
  - HIAL
  - MOD
  - NATS Aberdeen (no comment until airspace designs available)
  - A locally based GA pilot
  
- Local Bodies: Representative, Conservation, Charity and Industry;
  - Oil & Gas Authority (OGA)
  - Melness Crofters Estate
  - RSPB Scotland (no further comment to questionnaire)
  - Scottish Natural Heritage

## Responses Received to Second Round of Engagement

Following the second round of Stakeholder Engagement commenced on 9 December 2019, and then re-issued on 07 January 2020, a total of 13 responses were received, from:

- ANSPs and the Aviation Industry:
  - British Airways
  - British Gliding Association (BGA)
  - British Microlight Aircraft Association (BMAA)
  - HIAL
  - Lanarkshire Lothian Soaring Club (LLSC), also representing the Scottish Highland Paragliding Federation (SHPF)
  - NATS
  - The Honourable Company of Air Pilots
  - United Kingdom Flight Safety Committee (UKFSC)
  
- Local Bodies: Representative, Conservation, Charity and Industry;
  - OGA
  - RSPB Scotland
  - Scottish Natural Heritage
  - Vulcan Naval Reactor Test Establishment (NRTE)
  - Wildland Limited

The BMAA re-sent their generic 'Policy for Design Principles during ACP Engagement' document and made no further comment. In his response, the representative of the Honourable Company of Air Pilots felt the issues raised were local but sought confirmation of how the airspace would be closed for minimum duration required; this will be addressed in subsequent Stages of the application process.

HIAL asked only that the entry at Annex A1 describing their responsibilities be updated and, in response to the sponsor's individual follow-up sent on 07 January 2020, had no additional comments on the revised document.

A response was received from British Airways on 09 January 2020 that commented on the revised Environmental DP as well as two other Design Principles. Unfortunately, one comment appears to have been confused with a separate consultation for another spaceport being developed at Unst, Shetland. The second comment refers to Design Principle 10 which states the project may seek to apply for Statutory Instruments to legally prohibit flight over the area of SHS. The concerns raised by British Airways are acknowledged; however Design Principle 2 has been written to take into account the minimal impact of any restriction of airspace, by ensuring the volume of airspace is the minimum required, and that activation periods are kept to the minimum required.

In their response to the 09 December 2019 email, NATS was content the sponsor would consider the impact of re-routing aircraft, identifying this would impact on NATS' licence obligations. NATS also recognised the likely CAA requirement for more detailed environmental requirements for this ACP, as it was in support of commercial and not MOD operations. In response to the individual follow-up sent on 07 January 2020 on the revised document, NATS commented that the additional environmental requirements described were not directly associated with the NATS operation and only re-emphasised the requirement to identify the impact of the proposal on commercial aviation.

The response from the BGA, received on 13 January 2020, was the organisation's first response to our engagement activities and they commented on the Design Principles in their entirety. Although gliders occasionally use the nearby village of Tongue as a turning point, they acknowledged the relative infrequency of planned SHS launches meant that conflict of airspace use is unlikely to occur. Like other aviation stakeholders, the BGA highlighted the importance of minimising the dimensions and duration of activation of SHS airspace together with its efficient notification, activation and deactivation. The sponsor considers these priorities are addressed in Design Principles 2 and 4. The LLSC did not agree the statement constituted a Design Principle and assessed it as priority C, commenting the availability of airspace for recreational use was a higher priority for their organisation than the environment. They felt vertical launch was likely to have little impact for them, but stressed the importance of effective airspace notification and activation, which is addressed in Design Principles 2 and 4-7.

A response was received from the OGA suggesting the sponsor contacts the Health and Safety Executive (HSE) regarding the project. The HSE is already engaged as a regulatory stakeholder on the SIA.

In both their response to the 09 December 2019 email and subsequent 07 January 2020 follow-up, RSPB Scotland had no further comments.

In their response to the 09 December 2019 email, Scottish Natural Heritage commented the discussion around Design Principle 8, 'the airspace design will aim to minimise the re-routing of aircraft, including those low-flying' did not provide sufficient mitigation. On the Environmental

Design Principle (DP11), they questioned where the environmental impacts of changes to the use of the airspace as a result of the proposal would be considered, if not in the ACP. In a 07 January 2020 follow-up, the sponsor reassured Scottish Natural Heritage that at Stage 2, when actual design options for the airspace are developed, their concerns about the impact to low flying of the proposal will be considered. In addition, the sponsor confirmed the revised Environmental Design Principle would address both the environmental impact of changes to the use of the airspace and launch activities within the proposed airspace. In their response on 13 January 2020 to the 07 January 2020 follow-up email, Scottish Natural Heritage agreed the revised version constituted a design principle but suggested a different wording. They agreed the Design Principle should be allocated priority B but commented that whilst the launching element of the activity was significant for them, land-based activities were their highest priority.

Wildland Limited is the neighbouring landowner to SHS, managing their estate to enhance the environmental and natural capital of the area. In a detailed response, Wildland highlighted the baseline 'do nothing' scenario as a starting point and identified that many local areas are subject to a range of environmental designations. Wildland also recognised the difficulty in applying airport and aviation-focused CAP 1616 environmental metrics to SHS, a fact acknowledged by both the sponsor and CAA and taken into account in the revised Design Principle. Like the sponsor, Wildland also identified that SHS will need to work closely with NATS and MOD to ensure the environmental impact on commercial and military aircraft of the activation of SHS airspace is minimised; revised Design Principles 2, 4 and 6 refer.

In their response, Vulcan NRTE suggested re-wording the Design principle to 'minimise so far as practicable the environmental impact of the Space Hub's operations'. In a similar vein, the UK Flight Safety Committee also suggested re-wording the Design Principle to 'minimise the environmental impact as far as practicable'. The sponsor is grateful for these suggestions and has re-worded the proposed environmental Design Principle accordingly, as detailed under the heading 'Design Principle 11' below.

## Design Principle 1

**The safety of other airspace users is the paramount consideration in the design of the ACP.**

SIA (2018) makes reference to 'aircraft to which spaceflight activities might pose a hazard and aircraft that might pose a hazard to spaceflight activities', so covering both eventualities. In their questionnaire response, NATS identified that the primary safety consideration should focus on protecting other airspace users from launches to satisfying the principles associated with the establishment of segregated SUA.

In this Design Principle, the term 'other airspace users' includes Commercial Air Transport (CAT), military and all types of General Aviation (GA), both fixed wing and helicopters, and Unmanned Air Systems.

In the past, most SUA has been established for MOD activities, which is reflected in most related documents being authored by the MOD. However, the SHS ACP is novel, perhaps unique, in its requirement to establish SUA for commercial use. SUA is routinely promulgated as a Danger Area (DA), which is defined as, "Airspace which has been notified as such within which activities dangerous to the flight of aircraft may take place or exist at such times as may be notified<sup>4</sup>". The

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<sup>4</sup> UK AIP, ENR 1 General Rules and Procedures, 5.1 Airspace Restrictions  
<https://www.aurora.nats.co.uk/htmlAIP/Publications/2019-06-20-AIRAC/html/eAIP/EG-ENR-1.1-en-GB.html>

CAA Policy Statement *Special Use Airspace - Safety Buffer Policy for Airspace Design Purposes*, dated 22 August 2014, states that “all Danger Area activities related to the release of ordnance (which, for purposes of this document, includes launch to orbit) undertaken within the London and Scottish Flight Information Regions (FIRs) must have an associated Range Danger Area/Zone (RDA/Z) based on a ‘worst case’ event”.

Again, in the absence of equivalent civil documents, the MOD Joint Services Publication (JSP) 403 *Handbook of Defence ranges safety*<sup>5</sup> states that, “The RDA/Z takes into account the latent energy of the delivery vehicle and, where appropriate, the component parts of such a device”. As NATS states, and with which the sponsor agrees, it remains the responsibility of the originator of the activity to take all reasonable precautions to ensure the safety of others as required by SIA (2018), which requires that licence holders minimise third party risk to a level that is As Low As Reasonably Practicable (ALARP) and to demonstrate this through a safety case. Whilst HIE is the sponsor for the airspace change proposal, it will be the Launch Vehicle Operator who is the originator of the space activity. The sponsor will work closely with all space licence holders to ensure safety requirements are met. In their response, the OGA’s only comment was to recommend the Health and Safety Executive (HSE) be contacted on the possible effect of debris on airspace and oil platform safety zones. The sponsor considers the possible effect of debris on airspace is addressed with the comments above on DAs and the possible effect of debris on oil platform safety zones will be addressed by legislation derived from the SIA (2018), with which the HSE is already engaged. With regard to the SIA (2018), regulation and guidance derived from it has yet to be issued, so the sponsor will use the RDA/Z definition as a working assumption and will work closely with the SHS Range Control and Launch Operator licence applicants to ensure the ACP meets all requirements of a robust safety case.

Having analysed the feedback and confirming the sponsor considers the safety of other airspace users to be paramount, this Design Principle is not amended.

### **Proposed text of Design Principle**

The safety of other airspace users is the paramount consideration in the design of the ACP.  
**Priority A - Safety.**

### **Design Principle 2**

**In accordance with Flexible Use of Airspace (FUA) principles, the volume of segregated SUA defined will be of the minimum dimensions necessary, activated for the minimum duration required, to ensure the safety of other airspace users whilst minimising its impact.**

The background classification of the SHS airspace will remain unchanged. As activities potentially hazardous to flight may take place within the segregated SUA established the sponsor does not seek to establish any other classes of airspace. Furthermore, due to the overarching requirement for safety and the segregated nature of the SUA, it is unlikely the introduction of Radio Mandatory Zones (RMZs) or Transponder Mandatory Zones (TMZs) would add value to the proposal. Additional airspace solutions, such as ‘clear range’ procedures as used by naval forces, will however be considered, although as mentioned earlier these would have to be appropriately defined and agreed by all parties and also meet the robust safety case requirements for the activity.

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<sup>5</sup> Joint Services Publication 403 Vol IV Glossary of Terms and Definitions  
([https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/33907/JSP403\\_Vol4v2\\_3.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/33907/JSP403_Vol4v2_3.pdf))



The dimensions of the required volume of airspace will be defined by the trajectories of the vehicles launching from SHS, supplemented by a launch safety analysis of various scenarios, initially using extant CAA policy described in the discussion on Design Principle 1. When regulations and guidance from the SIA (2018) are issued, the proposal may be amended if necessary, to comply with those regulations and guidance.

To cater for different launch vehicles, the airspace designed will be scalable and is likely to form a mosaic of sectors, with only the specific sector required for a given launch activated on each occasion. The sponsor takes responsibility to ensure the promulgated dimensions of the SUA are the minimum required to meet the task.

The individual GA pilot who responded accepted that a reasonable 'exclusion zone', objectively based on safety and security requirements which was time bound in accordance with the launch programme and Airspace Management principles would be acceptable. However, they did caution that large areas of SUA, active for extended periods would negatively impact their operations with financial consequences. This is not the sponsor's intent.

Recognising the potential negative impact on other airspace users of closing large tracts of airspace, after safety and the ability for launches to be conducted, accessibility for other users is the highest priority for the sponsor. The original text to Design Principle 1 included reference to FUA principles but, as this is now addressed in Design Principle 4, the phrase relating to FUA is removed.

#### **Proposed text of Design Principle**

The volume of segregated SUA defined will be of the minimum dimensions necessary, activated for the minimum duration required, to ensure the safety of other airspace users whilst minimising its impact.

**Priority B - Access.**

### **Design Principle 3**

#### **SHS will only be for vertical launches to put small satellites into orbit**

The sponsor confirms no horizontal launches or manned spaceflights will be conducted from SHS and there will be no runway associated with the site. This confirmation means the extent of overland airspace developed will be the minimum required to support the launch of vertical systems over the sea.

This Design Principle was given the highest priority in the response from Scottish Natural Heritage, but without an explanatory comment. As the sponsor has confirmed that only small satellites will be launched vertically from SHS, with no horizontal launches or manned spaceflights, while it will be taken into account in design options for the airspace, other Design Principles are considered to be of higher importance. This Design Principle echoes Principle 2 as it seeks to minimise the impact of the proposal over land to both other airspace users.

#### **Proposed text of Design Principle**

SHS will only be for vertical launches to put small satellites into orbit.

**Priority C - Access.**

## Design Principles 4-7

The SHS ACP shall take into account the implications for SUA of Free Route Airspace (FRA) and CAP 1711, which will impact upon the design of associated Flight Planning Buffer Zones (FBZ) and subsequent notification requirements.

The SHS ACP shall employ current and evolving best practise in the notification, activation and deactivation of the SHS airspace.

As part of the design process, the priority afforded to the proposed airspace will need to be agreed, and subsequently managed, in line with government priorities and taking account, for example, of adjacent MOD FUA.

The airspace design shall include the development of Letters of Agreement (LoA) and Memoranda of Understanding (MoU) between relevant parties.

For the proposal to be successful, the sponsor recognises effective interagency planning and coordination employing FUA principles will be essential. With the exception of an element of Design Principle 6, Design Principles 4-7 all relate to the requirement that the proposal shall comply with existing and planned UK Airspace Management (ASM) policy, as laid down in CAP 740, *UK Airspace Management Policy* and associated documents, such as CAP 1711, *Airspace Modernisation Strategy*. The principle objective of UK ASM policy is 'to achieve the most efficient use of airspace through dynamic time-sharing and, at times, the segregation of airspace amongst various categories of airspace users on the basis of short-term needs'. Draft Design Principles 4-7 were derived from questionnaire responses, aviation Focus Group discussions and subsequent interactions with NATS, Highland and Islands Airports Limited (HIAL) and MOD and, although they did not comment why, Scottish Natural Heritage also identified this as their second highest priority.

Currently, policy for airspace sharing arrangements focuses mainly on the relationship between the civil aviation network and military airspace requirements. The proposal to introduce SUA to meet commercial space requirements adds a further dimension to this policy. The sponsor seeks to work with other stakeholders, notably NATS and the MOD, under the regulatory guidance of the CAA, to integrate the SHS ACP into existing and planned ASM policy. Elements of this integration will include but are not limited to the following:

- Current and evolving best practise in the notification, activation and deactivation of the SHS airspace;
- The implications for SUA of Free Route Airspace (FRA) and CAP 1711, *Airspace Modernisation Strategy*;
- Minimising the impact upon the civil network, and all airspace users, where possible;
- The priority afforded to the proposed airspace should be in line with government priorities and take account, for example, of adjacent MOD SUA. In their response to the draft Design Principles document, the MOD specifically identified the future prioritisation of the Cape Wrath range complex (EG D801/802/803), which is adjacent to the SHS site and requests for its activation can be of one week or less. These priorities will need to be agreed with NATS, MOD and co-ordinated with both QinetiQ and the MOD, to ensure the overall effect of multiple segregated airspace requirements do not overly impact upon the UK Upper Airspace network ability to maintain a viable solution for commercial aviation;
- Taking into account large-scale biannual military exercises and their operation in both unsegregated and temporary segregated airspace;



- The development of Letters of Agreement (LoA) and Memoranda of Understanding (MoU) between relevant parties. It is understood that NATS is working with the UKSA and CAA to provide a template LoA for all potential spaceports in respect of SUA notification principles and methodologies. MOD are also keen to engage in these developments;
- The UK Flexible Use of Airspace State Project (FSP), led by the CAA, with NATS, the MOD and other stakeholders, is looking at Advanced Flexible Use of Airspace (AFUA). AFUA is considering the processes, decision-making and technology required to optimise the management of airspace including the notification, promulgation and activation of SUA. Where appropriate, the SHS ACP would like either to contribute to, or be informed by, discussions on AFUA.

It is therefore proposed to amalgamate draft Design Principles 4-7 into a single overarching Design Principle.

### Proposed text of Design Principle

The SHS ACP will comply with current and planned UK ASM policy including the application of FUA principles for the notification, activation and deactivation of segregated SUA.

**Priority B - ASM.**

### Design Principle 6

**As part of the design process, the priority afforded to the proposed airspace will need to be agreed, and subsequently managed, in line with government priorities and taking account of, for example, adjacent MOD FUA.**

With most of the elements of Design Principles 4-7 combined into one, it is important to take into account views expressed in questionnaire responses, including one received from a Search and Rescue (SAR) operator, and in both the aviation and non-aviation Focus Group meetings, regarding access to the SHS SUA for priority aircraft. The sponsor recognises the need to allow access to priority aircraft including Category A (e.g. aircraft in emergency), Category B (e.g. Search and Rescue) and, in addition, Defence Operational Tasking (e.g. Air Defence Priority Flights). Design Principle 6 becomes Design Principle 5 and is reworded to meet this requirement.

### Proposed text of Design Principle

The SHS ACP will take into account the requirements for priority access to SHS including for example to aircraft in emergency, aircraft conducting SAR operations and to other priority flights.

**Priority B - Access.**

### Design Principle 8

**The airspace design will aim to minimise the re-routing of aircraft, including those low-flying**

The re-routing of aircraft, especially those low-flying, could result in additional disturbance for breeding and wintering populations of birds in north Sutherland. This observation was raised in their questionnaire response by Scottish Natural Heritage. Launches from SHS will be northward over the sea and the proposed airspace will also be predominantly over the sea, from the surface and extending north from the coast with a minimum over-land component. Although when it is active, all aircraft will need to re-route around it, its activation should not result in any increase in low-flying. However, in their response, HIAL commented they should be able to assist with considerations of the low-level air traffic. The Design Principle is therefore re-numbered to Design Principle 6 and amended to remove the phrase 'including those low-flying'.

### **Proposed text of Design Principle**

The airspace design will aim to minimise the re-routing of aircraft.

**Priority B - Access.**

### **Design Principle 9**

**The proposal will comply with internationally recognised norms for related spaceflight activities that transit the airspace of other states**

The trajectories of spacecraft launching from SHS are likely to include the overflight of other states' airspace and the possible jettison of spent rocket stages. International Civil Aviation Organisation (ICAO) procedures for the notification by Notice to Airmen (NOTAM) of launch activities already exist and it is understood the UK government is also in discussion with neighbouring states likely to be affected by operations from SHS. The sponsor will be guided by the outcome of those discussions in the development of the ACP. This Design Principle is re-numbered to Design Principle 7 but is not amended.

### **Proposed text of Design Principle**

The proposal will comply with internationally recognised norms for related spaceflight activities that transit the airspace of other states.

**Priority B - ASM.**

### **Design Principle 10**

**The ACP may seek to legally prohibit overflight of some areas associated with the SHS operation through the application of byelaws or Statutory Instruments (SIs).**

This Design Principle requirement was raised during the aviation Focus Group Meeting. The activation of SUA in the form of a DA serves to notify other airspace users of activities that have the potential to be hazardous to flight, but it neither prohibits nor restricts flights within it. A requirement may be identified to legally prohibit overflight of some areas through the application of byelaws or SIs. Should this prove to be the case, the airspace will be of the minimum dimensions necessary, activated for the minimum duration required to meet the requirement. In their responses, HIAL commented they may be able to assist in the design and monitoring of such airspace and the MOD reiterated their concerns about access to the EG D801/802/803 range complex for their assets. The Design Principle is not amended but is re-numbered to Design Principle 8.

### **Proposed text of Design Principle**

The ACP may seek to legally prohibit overflight of some areas associated with the SHS operation through the application of byelaws or Statutory Instruments (SIs).

**Priority C - Access**

### **Design Principle 11**

**HIE will be required to undertake an Environmental Assessment associated with the re-routing of aircraft to avoid SUA.**

In its first submission, an assumption was made that the specific environmental impact of launches would be addressed by other regulatory activities associated with SHS and not by the CAP 1616 process. In particular it was assumed applications for Spaceport and Launch Vehicle Operator

licences under the Space Industry Act (2018) would address the environmental impacts of the activity. This being the case, the previous environmental Design Principle only considered the impact on aviation emissions and pollution due to the dispersal and re-routing of aircraft during activation of the airspace to facilitate launches.

However, in their Gateway Assessment, the CAA concluded this approach was insufficient to meet the environmental requirements of CAP 1616 Appendix B. The sponsor acknowledges CAP 1616 requires a more comprehensive assessment and accepts the environmental Design Principle should be amended to reflect this intent. Extensive work is already being undertaken for the Environmental Impact Assessment (EIA) associated with the SHS Planning Application and it is anticipated that it will be possible to re-use elements of this work to support the development of metrics for the airspace change application. However, additional metrics may be required, and this will be the subject of discussions with the CAA. The SHS ACP is not associated with an airport, so many of the environmental metrics detailed in CAP 1616 may not be applicable to the proposal. Instead, when compared to an airport, activities from SHS are likely to be very infrequent, but with a high level of noise for a very short duration of time. Different metrics will therefore be needed to assess the impact of launches and the sponsor will work with the CAA to identify, develop and agree these. For example, in the United States where commercial space operations are more advanced, specific environmental metrics for spaceflight operations have been developed and the sponsor will investigate the appropriateness of these metrics for SHS.

In addition, the sponsor acknowledges the requirement stipulated by the CAA to assess the environmental impact of launch vehicle stage drop zones, including those outside the boundary of UK responsibility in another state's Exclusive Economic Zone (EEZ).

In light of the discussion above, in addition to addressing the noise, CO<sub>2</sub> emissions and fuel burn associated with the re-routing of other airspace users, the revised Design Principle captures the requirement to assess the environmental impact of the proposed airspace change in its entirety. The sponsor acknowledges that it will need to work with the CAA to develop suitable environmental assessment metrics and hopes to use data from the Planning Application EIA where possible.

The text of the Design Principle is therefore amended, and the Design Principle is re-numbered to Design Principle 9.

### Proposed text of Design Principle

Design options will be developed with the aim of minimising the environmental impact of the airspace change.

### Priority B - Environment

#### Design Principle 12

**The ACP will take into account other regulatory requirements associated with SHS and, where available and appropriate, reuse existing assessments.**

The secondary legislation and guidance associated with the SIA (2018) has not yet been issued. The Act includes the requirement for several licences associated with operations from SHS, such as a Spaceport Licence, Range Control Licence and Launch Vehicle Operator Licence. In the development of the ACP, the sponsor will take account of any requirement associated with these various licences and a meeting is planned with both airspace and spaceflight regulators to

establish an integrated approach between regulatory regimes for the proposal. The text of the Design Principle is not amended but is re-numbered as Design Principle 10.

### **Proposed text of Design Principle**

The ACP will take into account other regulatory requirements associated with SHS and, where available and appropriate, reuse existing assessments.

### **Priority C - Regulation**

### **Additional Comments**

The MOD was the only stakeholder to provide additional comments, suggesting an additional Design Principle specifically to “Minimise impact on other airspace users”. The sponsor acknowledges the comment but suggests the observation is already addressed in Design Principle 2, which states “the volume of segregated SUA defined will be of the minimum dimensions necessary, activated for the minimum duration required, to ensure the safety of other airspace users whilst minimising its impact”.

## Final Shortlist of Design Principles

### SHS Prioritised Design Principles

Following the preceding analysis, the prioritised and reclassified list of SHS ACP Design Principles is shown in Table 2 below.

	Category	Priority	Design Principle
DP1	Safety	A	The safety of other airspace users is the paramount consideration in the design of the ACP.
DP2	Access	B	The volume of segregated SUA defined will be of the minimum dimensions necessary, activated for the minimum duration required, to ensure the safety of other airspace users whilst minimising its impact.
DP3	Access	C	SHS will only be for vertical launches to put small satellites into orbit.
DP4	ASM	B	The SHS ACP will comply with current and planned UK ASM policy including the application of FUA principles for the notification, activation and deactivation of segregated SUA.
DP5	Access	B	The SHS ACP will take into account the requirements for priority access to SHS including for example to aircraft in emergency, aircraft conducting SAR operations and to other priority flights.
DP6	Access	B	The airspace design will aim to minimise the re-routing of aircraft
DP7	ASM	B	The proposal will comply with internationally recognised norms for related spaceflight activities that transit the airspace of other states.
DP8	Access	C	The ACP may seek to legally prohibit overflight of some areas associated with the SHS operation through the application of byelaws or Statutory Instruments (SIs).
DP9	Environment	B	Design options will be developed with the aim of minimising the environmental impact of the airspace change.
DP10	Regulation	C	The ACP will take into account other regulatory requirements associated with SHS and, where available and appropriate, reuse existing assessments.

Table 2 SHS Prioritised Design Principles

## CAP 1616 Next Steps

This document will be submitted to the CAA as evidence to support Step 1B of the CAP 1616 airspace change process in advance of the Stage 1 Define Gateway.

Following successful completion of the Stage 1 DEFINE Gateway, design options will be developed and shared in further stakeholder engagement. The Design Principles will be used as the framework against which Design Options are developed and assessed to address the Statement of Need.

Currently, the estimated timeline for subsequent stages of the SHS ACP are shown in Table 3 below:

CAP 1616 Stage	Status	Target Completion Date
Stage 1 Define	Expected	31 January 2020
Stage 2 Develop and Assess	Expected	24 April 2020
Stage 3 Consult	Expected	28 August 2020
Stage 4 Update and Submit ACP	Expected	29 January 2021
Stage 5 Decide	Expected	30 July 2021
Stage 6 Implement	Expected	November 2021

Table 3 CAP 1616 Stage Steps



## A1 Stakeholders Engaged

### Aviation Stakeholder Matrix

The following tables represent key aviation stakeholders identified by the sponsor as potentially being affected by the proposal, and who have been engaged during the development of the Design Principles.

#### Local Aviation Stakeholders

The sponsor has engaged with the following local aviation stakeholders:

Local Stakeholders	
Police Scotland	HM Coastguard Inverness and Stornoway
Far North Aviation, Wick Airport	Private pilot, Wick Airport

Table 4 Local Stakeholders

The sponsor was notified (on 04 November 2019) of the helicopter companies listed below that support offshore Oil and Gas installations to the north of Sutherland. Although these companies have not yet been engaged, they will be contacted to comment on all future stakeholder engagement activities:

Helicopter Companies	
Babcock MCSO	CHC-Scotia
Bristow Helicopters	NHV Helicopters

Table 5 Helicopter Companies

#### Air Navigation Service Providers

The sponsor has engaged with the following ANSPs:

ANSP	
NATS CTC	NATS Prestwick Centre
NATS Aberdeen Airport	Highlands and Islands Airport (HIAL) Ltd representing Wick (John O'Groats), Inverness, Kirkwall and Sumburgh Airports
Serco Scatsta Airport	RAF Lossiemouth (represented by DAATM)
MOD Tain Range/Cape Wrath (represented by DAATM)	

Table 6 Air Navigation Service Providers

#### National Aviation Organisations

The sponsor has engaged with the following National Aviation Organisations through the National Air Traffic Management Advisory Committee (NATMAC):

National Aviation Organisations	
Airlines UK	Airport Operators Association
Airfield Operators Group	Aircraft Owners and Pilots Association
Association of Remotely Piloted Aircraft Systems	British Airways
BAE Systems	British Airline Pilots' Association
British Balloon and Airship Club	British Business & General Aviation Association
British Gliding Association	British Helicopter Association
British Hang Gliding and Paragliding	British Micro-light Aircraft Association



Association	
British Model Flying Association	British Parachute Association
Future Airspace Strategy VFR Implementation Group	General Aviation Alliance
General Aviation Safety Council	Guild of Air Traffic Control Officers
Honourable Company of Air Pilots	Helicopter Club of Great Britain
Heavy Airlines	Low Fares Airlines
Light Aircraft Association	MoD Defence Airspace & Air Traffic Management (DAATM)
Military Aviation Authority	Navy Command HQ
NATS	UK Airprox Board
PPL/IR	USAFE (3 <sup>rd</sup> AF DOF)
UK Flight Safety Committee	

Table 7 National Air Traffic Management Committee

## Non-Aviation Stakeholder Matrix

The following tables represent non-aviation stakeholders, identified by the sponsor as potentially being affected by the proposal, who have been engaged during the development of the Design Principles.

### Local Bodies: Representative, Conservation, Charity and Industry

The sponsor has engaged with the following local bodies:

Local Bodies	
Caithness Chamber of Commerce	Oil and Gas Authority
Dounreay Nuclear Power Development Establishment	RNLI
Melness Grazing Committee	RSPB Scotland
John Muir Trust	Scottish Ambulance Service North Region
Melness Crofters Estate	Scottish Natural Heritage
National Federation of Fishermen's Organisation	The Highland Council
Nuclear Decommissioning Authority (NDA)	Tongue, Melness and Skerry Community Council
Vulcan Naval Reactor Test Establishment (NRTE)	Wildland Scotland

Table 8 Local Bodies

### Elected Representatives

The sponsor has engaged with the following elected representatives:

Elected Representatives	
Jamie Stone, MP for Caithness, Sutherland and Easter Ross	Jamie Halcro Johnston, Regional MSP for Highlands & Islands
Gail Ross, Constituency MSP for Caithness, Sutherland and Ross	Edward Mountain, Regional MSP for Highlands & Islands
John Finnie, Regional MSP for Highlands & Islands	David Stewart, Regional MSP for Highlands & Islands
Rhoda Grant, Regional MSP for Highlands & Islands	Maree Todd, Regional MSP for Highlands & Islands

Table 9 Elected Representatives

## A2 – Stakeholder Questionnaires

### Questions for Aviation Stakeholders

Your Representative Organisation: for example: ANSP, Regional Airport, General Aviation Operator, Glider Pilot, etc.

1. Please list any constraints that might limit the lateral and/or vertical extent of any airspace solution that you feel HIE should consider when designing an airspace solution to protect the launches. Please list your reasons.
2. Please advise us of any coordination requirements between HIE and other Air Navigation Service Providers (ANSPs) that should be considered during the development of new airspace restrictions established by HIE.
3. Are you aware of anything in the CAA Airspace Modernisation Strategy that presents a risk or opportunity to HIE in development of the airspace solution to protect the Space Hub launches? Please provide details.
4. Do you envisage that a Letter of Agreement (LoA) or Memorandum of Understanding (MoU) or other agreement with HIE will be required? If so, please provide details of what you would expect to be required as part of this agreement.
5. Please let us know if there are any day-time or night-time specific constraints that you consider HIE could take into account when considering the airspace solution required to protect the vertical space launches. Please provide details and reasons.
6. Please tell us if there are there any other operational constraints that HIE will need to consider when planning its new airspace solution.
7. Please inform us of who you consider to be the other key local aviation stakeholders that you believe HIE should engage with during the process of designing an airspace solution to protect the vertical space launches. Please provide contact details and reasons.
8. Please provide details of any constraints imposed by restricted airspace operations in the area encompassed by HIE's Space Hub Sutherland's potential operating area (e.g. military operations, danger areas, restricted areas, route crossings, transit corridors, training areas etc.)
9. Please provide details of any issues or constraints due to local helicopter operations that you believe may have an impact within the proposed area of the Space Hub Sutherland operating area.
10. Please advise us of any other issues or constraints you feel HIE could consider when designing its new airspace solution to protect the vertical space launches. Please provide details.
11. What impact or constraints will Space Hub Sutherland airspace solution to protect vertical space launches have on local GA/VFR operations. Please provide details.
12. Please provide details of any constraints that may be occasioned by local gliding activities on, or adjacent to the Space Hub Sutherland launch site.
13. A thorough Environmental Impact Assessment is being conducted by HIE as part of the Planning Application process. Are there any specific environmental factors associated with the airspace change application that you believe should be considered by HIE?
14. Please state any principles you believe that HIE could adopt to mitigate (in full or in part) the direct or indirect impact of rocket launches on aviation emissions or pollution. For example, due to the dispersal of other air traffic during launch periods.
15. HIE is currently engaging with local and national organisations and a full public consultation is planned in due course. However, please let us know of any local or national organisations that you believe HIE should include in its formal consultation.

## Questions for Non-Aviation Stakeholders

Your Representative Organisation: for example, Member of Scottish Parliament, Borough Council, Community Council Representative, Individual, Local Fisherman, etc

1. Please list any constraints that might limit the lateral and/or vertical extent of any airspace solution that you feel HIE should consider when designing an airspace solution to protect the launches. Please list your reasons.
2. Please let us know if there are any day-time or night-time specific constraints that you consider HIE could take into account when considering the airspace solution required to protect the vertical space launches. Please provide details and reasons.
3. Please inform us of who you consider to be the other key non-aviation stakeholders that you believe HIE should engage with during the process of designing an airspace solution. Please provide contact details and reasons why you feel they are relevant.
4. Please highlight your awareness of any particularly sensitive issues with noise associated with the vertical space launches over the day or night-time period.
5. Please tell us of any locations of any particularly sensitive wildlife habitats, not already notified (linked to AONB, SSSI etc), that might be sensitive to noise from the vertical space launch area.
6. A thorough Environmental Impact Assessment is being conducted by HIE as part of the Planning Application process. Are there any specific environmental factors associated with the airspace change application that you believe should be considered by HIE?
7. Are there any other local development projects that HIE should be aware of and consider when planning its airspace solution for the Space Hub Sutherland? Please provide details.
8. HIE is currently engaging with local and national organisations and a full public consultation is planned in due course. However, please let us know of any local or national organisations that you believe HIE should include in its formal consultation.
9. Please state any principles you believe that HIE could adopt to mitigate (in full or in part) the direct or indirect impact of rocket launches on aviation emissions or pollution. For example, due to the dispersal of other air traffic during launch periods.
10. Please advise us of any other issues or constraints you feel HIE could consider when designing its new airspace solution to protect the vertical space launches. Please provide details.